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PHYSICS.—*A simple substitute for a cathetometer.*[1] J. B. FERGUSON, New York City.

A cathetometer is often used, especially by investigators of problems involving gases, when a pressure reading is desired with an accuracy of 0.1 mm. or better. This instrument is, however, very cumbersome and also expensive. It may be replaced to advantage by a "micrometer depth gauge," which is an inexpensive[2] machinists' tool of small size capable of giving readings with an accuracy of 0.01 mm. or 0.0005 inch.

These gauges usually consist of a vertical rod, with a sliding head mounted perpendicular to the rod and provided with a micrometer or a vernier. The head has a polished surface about $^1/_2$ inch (13 mm.) in width, which is sufficient to enable one to make an accurate setting by sighting across it against a mercury meniscus.

To illustrate the possibilities of such an instrument, one was set up in a retort stand with the head opposite the two surfaces of mercury in a partly-filled U-tube, and various observers determined by it the position of one mercury meniscus. Readings were made first with the gauge in front and then behind the U-tube. The results are given in table 1. This instrument was graduated in inches, but instruments graduated in millimeters are also obtainable.

[1] Received April 6, 1920.

[2] A four-inch instrument would cost not over ten dollars.

TABLE 1

LEVEL READINGS ON MERCURY MENISCUS, MADE BY DIFFERENT OBSERVERS

Observer	Reading inches	Position of gauge
A	0.631	In front of tube
	0.6315	In front of tube
B	0.6335	In front of tube
	0.6335	In front of tube
C	0.626	In front of tube
	0.624	In front of tube
A	0.3229	Behind tube
	0.321	Behind tube
B	0.325	Behind tube
	0.324	Behind tube
C	0.3234	Behind tube
D	0.315	Behind tube
	0.315	Behind tube
	0.314	Behind tube
E	0.3209	Behind tube
	0.319	Behind tube
	0.319	Behind tube

The different observers apparently did not all set alike, but each was able to repeat his own measurements with sufficient precision so that each could have measured a pressure difference to ±0.001 inch or about ±0.02 mm.

The above-mentioned use is but one of the many to which such a useful little instrument can be put and no doubt specially shaped heads could be obtained for particular purposes if desired.

BOTANY.—*Revision of the true mahoganies (Swietenia).* S. F. BLAKE, Bureau of Plant Industry.[1]

The genus *Swietenia*, from which the true mahogany of commerce is derived, was described by Jacquin[2] in 1760. His single species, *Swietenia mahagoni*, was based on a reference to plate 81 of the second volume of Catesby's Natural History of Carolina. This plate is also the basis of Linnaeus' *Cedrela mahagoni*,[3]

[1] Received March 12, 1920.

[2] Enum. Pl. Carib. 4: 1760.

[3] Syst. ed. 10. 940. 1759.

the first binominal name given to the mahogany. Catesby[4] gives a fairly good plate showing the fruit and leaves of the mahogany, with a figure of some withered flowers, and describes its manner of growth in the Bahamas.

About 1836 a second species, *S. humilis*, was added to the genus by Zuccarini,[5] described from specimens collected in Tehuantepec, Oaxaca, by Karwinski. For many years this species has remained comparatively little known. Recently, however, Harms[6] has referred to *S. humilis* a species grown in the Botanic Garden at Victoria, Camerun, West Africa, from seeds collected by Preuss near San Julian, El Salvador, on June 9, 1900. Preuss,[7] in his book on Central and South America, mentions in several places a mahogany which he calls *Swietenia bijuga*, a name never used by any other author (except as cited by Harms from Preuss' book), and not defined by Preuss. Under this name he refers not only to the species from El Salvador, discussed by Harms, but also to a mahogany from Venezuela, which is presumably the species recently described by Pittier[8] as *S. candollei*. Harms describes the species grown in Camerun as having leaflets 10 to 12 cm. long, 4 to 5 cm. wide, thus much larger than those of Zuccarini's original *S. humilis*, but he does not consider the plant botanically distinct. Specimens from Chiapas, collected by Seler (no. 1921), from Guerrero, collected by Langlassé (no. 132), and from Michoacan, collected by Endlich (no. 1335), are also referred to *S. humilis* by Harms. None of this material has been examined by the present writer, but it is clear from Harms' description of the Camerun material that it at least belongs to the species described below as *S. cirrhata*.

A third species, *Swietenia macrophylla*, was described and figured by King[9] in 1886, on the basis of trees grown in the Botanic Garden at Calcutta from seed supposed to be from

[4] Nat. Hist. Carol. 2: 81. Pl. 81. 1743.
[5] Abh. Akad. Muench. 2: 355. Pl. 7. 1835–36.
[6] Rep. Sp. Nov. Fedde 12: 210–211. 1913.
[7] Exped. Centr. u. Suedamer. 112, 432, 433, 440, 442. 1901.
[8] Journ. Wash. Acad. Sci. 10: 33. 1920.
[9] Hook. Ic. 16: pl. 1550. 1886.

Honduras. It is now known in the wild state from Tabasco and Campeche to eastern Guatemala and Honduras, and is evidently the only species of the genus on the eastern coast of Central America.

Swietenia candollei, recently described by Pittier,[10] is presumably the only species of *Swietenia* native in Venezuela. It is easily distinguished from *S. mahagoni* by its much longer leaflets and larger flowers, and from *S. macrophylla* by its longer petiolules and obtuse capsules.

A fifth species, not hitherto described, is represented in the National Herbarium by fine flowering material collected in Michoacan by Nelson, and by foliage material collected in Sinaloa and Oaxaca. This species has the subsessile leaflets which distinguish *S. humilis* from all other Swietenias hitherto described, but these are much larger than in that species and are provided with a very long twisted cusp formed by the excurrent midvein. To it evidently belong the specimens mentioned by Harms as grown at the Botanic Garden of Victoria in Camerun, from seeds collected by Preuss in El Salvador.

An interesting account of the history of the three species of mahogany previously recognized has been published by R. A. Rolfe in a recent number of the Kew Bulletin,[11] with references to illustrations and to much of the literature relating to the subject.

The distribution of the five species of Swietenia now known may be summarized as follows: *Swietenia mahagoni* is the only species known from the West Indies, Bermuda, and the Bahamas, as well as the keys of southern Florida. It has been introduced into Trinidad, Venezuela, and the Hawaiian Islands, and is recorded by Casimir DeCandolle from Peru, but the latter record is certainly very questionable. *Swietenia candollei* is a native of Venezuela. *Swietenia macrophylla* is the mahogany of the eastern coast of Central America, from Tabasco to Honduras,

[10] Journ. Wash. Acad. Sci. **10**: 33. 1920.
[11] Kew Bull. **1919**: 201–207. 1919.

and is also cultivated in botanic gardens at Trinidad, Buitenzorg, and Calcutta. *Swietenia cirrhata* is known in the wild condition from Sinaloa, Michoacan, Oaxaca, and El Salvador, and has been introduced into cultivation in the Botanic Garden at Victoria in Camerun. *Swietenia humilis* is known as a wild species from the coast of Guerrero, Oaxaca, and northwestern Guatemala. The distribution of these species, so far as it is now definitely known, is shown on the accompanying map. It remains to determine the identity of the mahoganies growing between Honduras and Colombia, and also that of the mahogany recorded from Peru as *S. mahagoni* in DeCandolle's monograph, at a time when only two species of the genus were known from America.

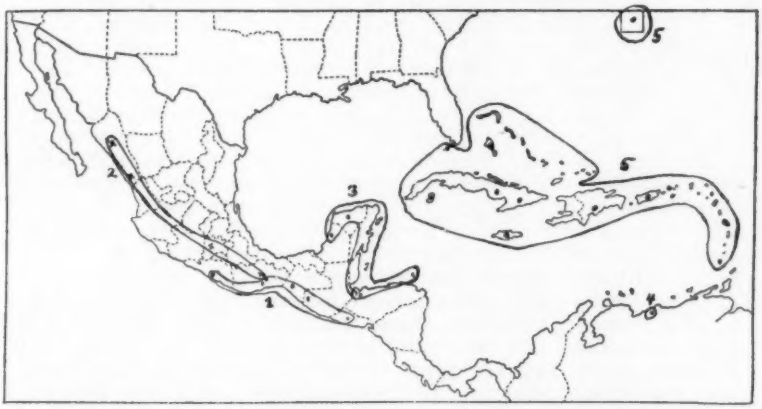

Fig. 1.—Map showing range of the species of *Swietenia*. 1, *S. humilis*; 2, *S. cirrhata*; 3, *S. macrophylla*; 4, *S. candollei*; 5, *S. mahagoni*.

(NOTE.—The southernmost locality shown on the map in the range of No. 1, *S. humilis*, belongs properly to No. 2, *S. cirrhata*.)

As is well known, the name mahogany is applied in the trade not only to the wood furnished by various species of Swietenia but also to similar woods derived from a considerable number of other trees, in some cases belonging to widely separated families. In fact, the bulk of the "mahogany" annually brought to market

is derived from other trees than Swietenia. Of the true mahoganies, belonging to the genus Swietenia, *S. macrophylla* is probably the one of most importance at the present time. This species grows on the Atlantic coast of Central America from Tabasco to Honduras and for an undetermined distance southward, and is shipped from Belize, Puerto Barrios, and various other points. *S. mahagoni*, of much importance in early days, is probably now marketed in less quantity than *S. macrophylla*. The species of western Mexico, *S. cirrhata* and *S. humilis*, are at present little utilized, and the same is true of the Venezuelan species, *S. candollei*.

Swietenia Jacq. Enum. Pl. Carib. 4. 1760.

Mahagoni Adans. Fam. Pl. **2**: 343. 1763.
"*Roia* Scop. Introd. 226. 1777."
Suitenia Stokes, Bot. Mat. Med. **2**: 436, 479. 1812.

Trees with hard and heavy red wood, glabrous throughout except for the sometimes ciliolate calyx and corolla; leaves alternate, abruptly pinnate, or sometimes odd-pinnate, the leaflets 2 to 6 pairs, opposite or subopposite, elliptic to oval, strongly inequilateral, subsessile or petiolulate; panicles axillary, pedunculate, many-flowered, the flowers whitish or greenish yellow, short-pedicellate; calyx (4 or) 5-lobed for one-third to one-half its length, the lobes semicircular or deltoid, broadly rounded to barely acutish; corolla imbricate in bud, the petals (4 or) 5, oblong-oval or obovate-oval; staminal tube (8 to) 10-toothed at apex, the teeth triangular, acute; anthers borne inside the tube at its apex, alternating with the teeth, subsessile, oval-oblong, obtuse; disk crenulate, about half as long as ovary or less; ovary (4 or) 5-celled, the cells bearing about 12 ovules in two rows of 6 or 7 each; style columnar, about as long as ovary or slightly longer; stigma discoid, thickened, crenulate, about as broad as ovary; capsule ovoid, rounded or umbonate at apex, septicidally dehiscing from the base or apex, with thick woody exocarp and much thinner leathery endocarp, the valves and seeds eventually deciduous leaving the persistent pentagonal narrowly 5-winged receptacle; seeds imbricate, about 12 in each cell, with more or less quadrangular body and much longer slightly broader wing thickened on the chalazal margin; embryo transverse, with broad, flat, oily cotyledons and minute radicle, and scanty albumen.

Type species *Swietenia mahagoni* Jacq.

KEY TO SPECIES

Leaflets subsessile; seeds light brown.
  Leaflets 5 to 9 cm. long, 0.8 to 3 cm. wide.....1. *S. humilis.*
  Leaflets 8.5 to 14 cm. long, 3 to 5 cm. wide.....2. *S. cirrhata.*
Leaflets distinctly petioluled; seeds dark chestnut-brown.
  Petals and sepals ciliolate; leaflets 6 to 18 cm. long; capsule 9 to 15 cm. long; seeds 7.5 to 10 cm. long.
    Petiolules 1.5 to 7 mm. long; capsule umbonate at apex 3. *S. macrophylla.*
    Petiolules 6 to 12 mm. long; capsule obtuse....4. *S. candollei.*
  Petals and sepals not ciliolate; leaflets 3.5 to 7.5 cm. long; capsule 4.5 to 7 cm. long; seeds 2 to 4 cm. long.5. *S. mahagoni.*

1. **Swietenia humilis** Zucc. Abh. Acad. Muench. **2**: 355. Pl. 7. 1835–36.

Tree 7 to 10 meters high, about 6 dm. in diameter, with dense head; branchlets gray; leaves with 2 to 5 pairs of leaflets; petiole 3.5 to 5 cm. long, the rachis 1.5 to 7 cm. long; leaflets 5 to 9 cm. long, 0.8 to 3 cm. wide, elliptic-lanceolate to elliptic-ovate, attenuate at apex and provided with a flattish cusp 3 to 7 mm. long, cuneate to rounded at base, subsessile, prominulous-reticulate both sides, somewhat paler green beneath; panicles pyramidal, 4 to 12.5 cm. long (including the 2.5 to 5.5 cm. long peduncle); pedicels 0.5 to 3 mm. long; calyx 1 mm. long, 5-lobed about to middle, the lobes deltoid, obtuse to acutish, papillose-ciliolate; petals obovate-oval, emarginate at the broadly rounded apex, ciliolate throughout, 5 mm. long, 2.8 mm. wide; staminal tube glabrous, the teeth lance-ovate, acute; disk crenate, papillose, about two-fifths as long as ovary; style shorter and stigma narrower than the ovary; fruit 15 to 20 cm. long, 10 to 12 cm. thick, ovoid, obtusely umbonate at apex; seeds about 10 in each cell, light brown, 6 to 9 cm. long, 2 to 2.5 cm. wide.

TYPE LOCALITY: Dry sunny places near Tehuantepec, Oaxaca, Mexico, altitude about 300 meters. Type collected by Karwinski.

SPECIMENS EXAMINED:

GUERRERO: Acapulco, 1894–95, *Palmer* 405.

OAXACA: Taretan, 1883, *Dugès* (Gray Herb.). Chivela, April 26, 1910, *Orcutt* 3190. Tonameca, altitude 25 meters, November 9, 1917, *Reko* 3549.

CHIAPAS: Between Santa Catarina and Santa Lucia, December, 1906, *Collins* (photog. of leaves and fruit).

GUATEMALA: Near Nenton, Huehuetenango, altitude 915 to 1220 meters, December, 1895, *Nelson* 3533.

The description of the floral details, which differs in some minor features from that of Zuccarini, has been that drawn up from the sheet in the Gray Herbarium collected in Oaxaca by Dugès, which was originally recorded in the Botanical Gazette.[12] Prof. Dugès gives the native name as "cobano." The species is easily distinguished by its comparatively small and attenuate subsessile leaflets.

Solereder[13] has made a careful microscopical examination of seeds of this species purchased of a drug-dealer in the Puebla market, and said to be very poisonous. Solereder finds that what had previously been described as albumen is in reality a part of the cotyledons. He finds, however, that a small amount of true albumen is present in the seeds.

Rose[14] states that the seeds of a Swietenia, referred to this species with some doubt, were sold by Indian peddlers near Acaponeta, Tepic, and were made into a tea which was taken for pains in the chest. The native name was given as "flor de venodillo (venadillo)."

2. **Swietenia cirrhata** Blake, sp. nov.

Tree; branchlets grayish brown, lenticellate; leaves with 3 to 6 pairs of leaflets; petiole 3 to 7.5 cm. long, the rachis 9 to 20 cm. long, terminated by a cusp 2 to 7 mm. long; leaflets 8.5 to 14 cm. long, 3 to 5 cm. wide, subopposite below, opposite above, obliquely ovate or elliptic-ovate, acuminate, tipped by a filiform twisted cusp 3 to 13 mm. long, acute to rounded at base, subsessile, pergamentaceous to subcoriaceous, pale green, glaucescent especially beneath, prominulous-reticulate on both sides, with 9 to 10 pairs of lateral veins; panicle 23 cm. long (including the 8 cm. long peduncle), 15 cm. wide; pedicels 1.5 to 2 mm. long; calyx 0.8 to 1 mm. long, 5-lobed to middle, the lobes broadly deltoid or suborbicular, broadly rounded, ciliolate; petals 5, oval-oblong, rounded, erose-ciliolate throughout, 4.8 mm. long, 2.8 mm. wide; staminal tube glabrous, 3.8 mm. long, the 10 teeth triangular-ovate, acutish; disk crenulate, papillose, half as long as ovary; pistil 4.5 mm. long; style about a quarter longer than ovary; seeds light brown, similar to those of *S. humilis*.

Type in the U. S. National Herbarium, no. 399294, collected at La Salada, Michoacan, Mexico, March 15 to 22, 1903, by E. W. Nelson (no. 6925).

[12] Bot. Gaz. **10**: 430. 1885.

[13] Archiv. Pharm. **229**: 249–258. Pl. 1891.

[14] Contr. U. S. Nat. Herb. **5**: 229. 1899.

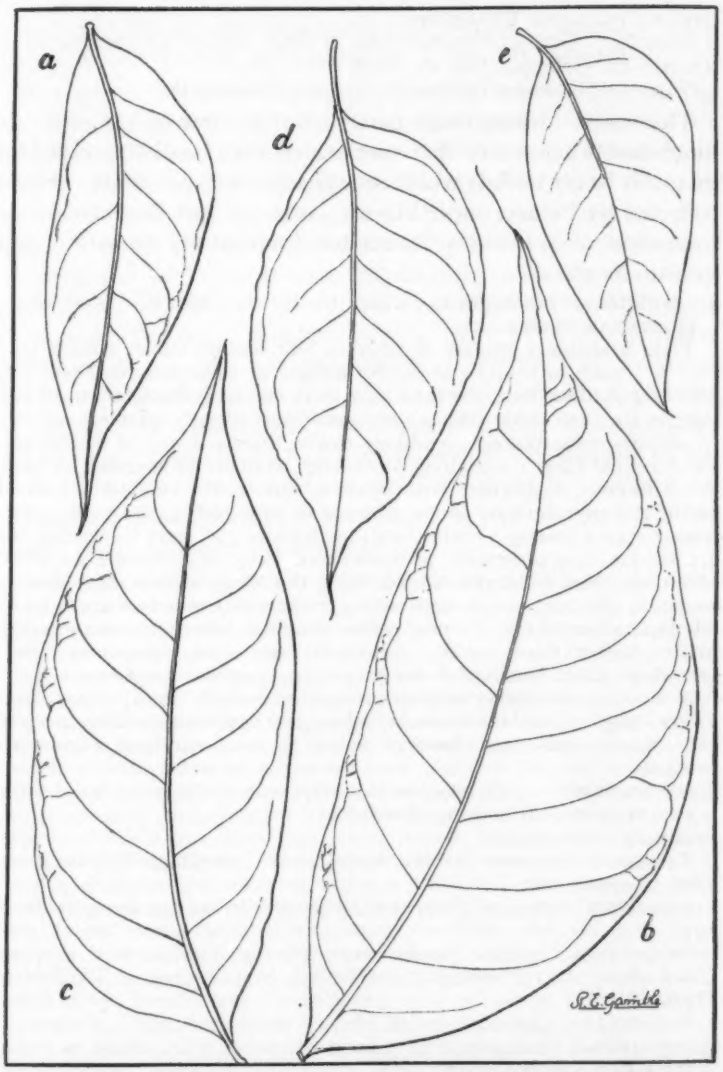

Fig. 2.—*Swietenia* leaflets, natural size. *a*, *S. humilis* Zucc. (drawn from *Reko* 3459); *b*, *S. cirrhata* Blake (*Nelson* 6925); *c*, *S. macrophylla* King (*Blake* 7866); *d*, *S. candollei* Pittier (*Pittier* 5789); *e*, *S. mahagoni* Jacq. (*Ricksecker* 247).

OTHER SPECIMENS EXAMINED:

SINALOA: Lodiego, October, 1891, *Palmer* 1616. On road between Rosario and Colomas, July 13, 1897, *Rose* 3186.

OAXACA: Chicapa, February 17, 1904, *Goldman* 738.

This species, whose range partly overlaps that of *S. humilis*, is most closely related to that species, but may be distinguished by its much larger leaflets which are usually, long cuspidate. Seeds collected by Palmer under his no. 1616 are not distinguishable from those of *S. humilis*, but are too fragmentary to afford any measurements.

3. **Swietenia macrophylla** King, Hook. Ic. **16:** Pl. 1550. 1886. HONDURAS MAHOGANY.

Tree; branchlets grayish or fuscous, lenticellate; leaves with 3 to 5 (or "6") pairs of leaflets, abruptly pinnate or sometimes odd-pinnate; petiole 4 to 8 cm. long, the rachis 4.5 to 15 cm. long; leaflets 6 to 18 cm. long, 2 to 7 cm. wide (the lowest sometimes slightly smaller), elliptic to elliptic-ovate, oblong, or oblong-ovate, short-pointed to acuminate, the terminal cusp 2 mm. long or obscure, cuneate to rounded at base, subcoriaceous, deep green both sides, reticulate, the veinlets impressed or slightly prominulous above, obscure or prominulous beneath; petiolules 1.5 to 4 (rarely 7) mm. long; panicles 13 cm. long (including the 4.5 to 7 cm. long peduncle); pedicels 2 mm. long; calyx sinuately 5-lobed about one-third its length, 0.8 mm. long, the lobes semicircular, broadly rounded, ciliolate; petals oval-oblong, truncate-rounded at apex, finely ciliolate, 4 mm. long, 2.2 mm. wide; staminal tube glabrous, equaling pistil, shorter than corolla, the teeth lance-ovate, acuminate; disk crenulate, about one-half as long as ovary, papillose; style once and a half as long as ovary; stigma crenulate, broader than ovary; fruit 15 cm. long, 7.5 cm. thick, ovoid, subacutely umbonate, rufous-fuscous, tuberculate; seeds deep chestnut-brown, 7.5 to 10 cm. long, 2 cm. wide or more.

TYPE LOCALITY: Cultivated at Botanic Garden, Calcutta, India, from seed supposed to be from Honduras.

SPECIMENS EXAMINED:

TABASCO: Common in the vicinity of Tepetitan, February 14, 1888, *Rovirosa* 181.

CAMPECHE: Apazote, near Yohaltun, December 31, 1900, *Goldman* 571.

GUATEMALA: Santo Tomás, near Puerto Barrios, June 4, 1919, *Blake* 7866. Las Playitas, Dept. Izabal, May 12, 1919, *Whitford & Stadtmiller* 48.

HONDURAS: Clearings, Swan Islands, April 7, 1913, *G. Nelson* 125 (Gray Herb.). Hacienda El Limón, Dept. Copán, May 7, 1919, *Whitford & Stadtmiller* 27.

CULTIVATED: Botanic Garden, Belize, British Honduras, December, 1905, *Kellerman* 5747. Panama Agricultural Experiment Station,

Groth. Botanic Garden, Port of Spain, Trinidad, December, 1913, *Mell.* Botanic Garden, Buitenzorg, Java, 1903 ("e Calcutta").

The genus Swietenia has generally been described as having abruptly pinnate leaves. Many of the leaves of the writer's no. 7866, however, are odd-pinnate, with the unpaired terminal leaflet smaller and somewhat less asymmetric than the next pair, and borne on a prolongation of the rachis about 2 cm. long. A few of the specimens of *S. mahagoni* show similar leaves.

Specimens with leaves and fragmentary fruits in the Gray Herbarium, collected on low hills in the valley of the Rio Negro, Guaguaqui, Boyacá, Colombia, July 14, 1917, by H. N. Whitford & J. Pinzon (no. 10), and recorded by Macbride[15] as *S. macrophylla*, probably belong to this species but are too incomplete to be satisfactorily determined. The local names are given by Whitford as "cedro caoba" and "cedro mondi." Material in the Kew Herbarium, said to have been collected by Antoine at Cartagena, Colombia, has been referred to this species by Rolfe in his recent paper on the genus.

4. **Swietenia candollei** Pittier, Journ. Wash. Acad. Sci. **10**: 33. 1920.
VENEZUELA MAHOGANY.

Tree up to 40 meters high; branchlets gray, lenticellate, those of the year fuscous green, glaucous; leaves with 3 to 5 pairs of leaflets; petiole 6 to 9.5 cm. long, the rachis 5.5 to 20 cm. long; leaflets 6.5 to 13 cm. long, 2.5 to 4.5 cm. wide (the lowest pair sometimes only 5 cm. long), oval or oval-ovate to oblong-elliptic, short-acuminate and usually falcate at apex, with a flat or slightly twisted cusp 3 mm. long or less, cuneate to rounded at base, prominulous-reticulate on both sides, paler green beneath; petiolules slender, 6 to 12 mm. long; panicles axillary, 9 to 18 cm. long (including the 5 to 8 cm. long peduncle), 3 to 6 cm. wide, loose; pedicels 2 to 4 mm. long; calyx 1 mm. long, 5-lobed for about one-third its length, the lobes semicircular, broadly rounded, finely erose-ciliolate; petals yellowish white, 4.5 to "6.5" mm. long, 3.3 mm. wide, oval-oblong, broadly rounded, unequally and broadly cuneate at base, finely erose-ciliolate throughout; staminal tube 3.8 mm. long, glabrous, its teeth triangular-ovate, acuminate; disk crenulate, papillose, nearly half as long as ovary; pistil 3.5 mm. long; ovary 5-celled, the ovules in two rows of 6 or 7 in each cell; style columnar, slightly shorter than ovary; stigma large, barely crenulate, slightly broader than ovary; fruit 9 to 14 cm. long, 6 or 9 cm. thick, ovoid, obtuse, dehiscing usually from the apex; seeds deep chestnut brown to ferruginous, 9 to 9.5 cm. long, 2.5 to 3 cm. wide.

[15] Contr. Gray Herb. N. S. **56**: 54. 1918.

TYPE LOCALITY: La Trinidad de Maracay, Venezuela.
SPECIMENS EXAMINED:
VENEZUELA: La Trinidad de Maracay, altitude 440 meters, State of Aragua, January 31, 1913, *Pittier* 5789 (type).

Distinguished from *S. mahagoni* by its larger leaflets, longer petiolules, larger flowers, and larger fruits and seeds; from *S. macrophylla* by its mostly smaller, paler, and thinner leaflets, and longer and more slender petiolules.

5. Swietenia mahagoni Jacq. Enum. Pl. Carib. 20. 1760. WEST INDIAN MAHOGANY.

Cedrela mahagoni L. Syst. ed. 10. 940. 1759.
Cedrus mahogani Mill. Gard. Dict. ed. 8. no. 2. 1768.
Swietenia mahogoni Desr.; Lam. Encycl. **3**: 678. 1791.
"*Swietenia fabrilis* Salisb. Prodr. 317. 1796."
Suitenia acutifolia Stokes, Bot. Mat. Med. **2**: 479. 1812.
Swietenia mahogani C. DC. Mon. Phan. **1**: 730. 1878.

Tree; branchlets gray or fuscous brown, lenticellate; leaves abruptly pinnate, with 2 to 6 pairs of leaflets, or rarely odd-pinnate; petiole 3 to 6.5 cm. long, the rachis 2 to 14 cm. long; leaflets 3.5 to 6 (rarely 7.5) cm. long, 1.3 to 2.5 (rarely 3.3) cm. wide, elliptic to ovate, acute to acuminate, with a terminal cusp 3 mm. long or less, cuneate to rounded at base, papery or chartaceous, prominulous-reticulate on both sides, paler green beneath; petiolules slender, 2 to 7 mm. long; panicles 4 to 8 cm. long (including the 2 to 4 cm. long peduncle); pedicels 2 to 4 mm. long; calyx 0.8 to 1 mm. long, 5-lobed about one-third its length, the lobes semicircular, broadly rounded, erose, glabrous; petals yellowish, 2.5 to 3 mm. long, obovate-oblong, broadly rounded, glabrous; staminal tube glabrous, its teeth deltoid, acutish; disk about one-third as long as ovary; style as long as ovary; stigma narrower than ovary; fruit ovoid, broadly rounded at apex, 4.5 to 7 cm. long, 3 to 5 cm. thick, grayish brown, verrucose, dehiscing from the base or from both ends;[16] seeds 2 to 4 cm. long, 1 to 1.3 cm. wide, deep chestnut-brown.

TYPE LOCALITY: Bahama Islands.
SPECIMENS EXAMINED:
FLORIDA: Lignum Vitae Key, 1877, *Garber;* 1892, *Simpson* 485. Coral soil, Umbrella Key, *Curtiss* 411.
BERMUDA: Flatts Village, 1905, *Harshberger.*
BAHAMA ISLANDS: Crow Hill, Andros Island, 1910, *Small & Carter* 8743. Nassau, Providence Island, 1913.
CUBA: Without locality, *Wright* 1153. Cayo Sabinal, Camagüey, 1909, *Shafer* 1105. La Gloria, Camagüey, 1909, *Shafer* 370. Cayo Coco, Camagüey, 1909, *Shafer* 2723. South of Holguin, Oriente, 1909, *Shafer* 1342.

[16] See ROLFE, Kew Bull. **1919**: 203. 1919.

ISLE OF PINES: Ensenada de Siguanea, 1916, *Britton, Wilson, & Selby* 14529.

JAMAICA: Berwich Hill, altitude 765 meters, 1899, *Harris* 7710. Papine, near Hope, altitude 240 meters, 1909, *Harris* 10821.

SANTO DOMINGO: 1871, *Wright, Parry & Brummel.* Lopez, 1887, *Eggers* 1836. Barahona, 1910, *Fuertes* 223. Azua, 1913, *Rose, Fitch, & Russell* 4082.

ST. THOMAS: 1881, *Eggers.*

ST. CROIX: Bassin yard, 1896, *Ricksecker* 247.

ANTIGUA: 1913, *Rose, Fitch, & Russell* 3313.

MARTINIQUE: 1881, *Duss* 1497.

GRENADA: 1905, *Broadway.*

CULTIVATED: Little River, Florida, *Ricker* 4066, *Tidestrom* 4178. Near Ponce, Porto Rico, 1886, *Sintenis* 4939. Botanical Garden, Port of Spain, Trinidad, 1913, *Mell.* Gamboa, near Caracas, Venezuela, 1918, *Pittier* 7947 (introduced from Santo Domingo). Oahu, Hawaiian Islands, 1911, *Curran* 115.

Although the first binomial given to this species was *Cedrela mahagoni* L., the parenthetical authority cannot be used for the name *Swietenia mahagoni* Jacq., since Jacquin makes no direct reference to the earlier name of Linnaeus.

Descourtilz[17] states that the bark of *S. mahagoni* is used as a tonic and astringent in the West Indies, and that it is often substituted for that of quinine, without, however, possessing the virtues of the latter. He also says: "C'est Lid'Oubouheri des hommes caraïbes, and Liacaïcachi des femmes." Solereder[18] states that a purgative known as "karapatoel" is extracted from the seeds.

Among some fruits of this species collected from a planted tree near Caracas, Venezuela, by Mr. Pittier, is one which has only four valves and four rows of seeds, and which must have come from a tetramerous flower. I have seen no other evidence in the genus of deviation from the pentamerous type. De Candolle,[19] however, describes the flowers as 4-or 5-merous.

[17] Fl. Med. Ant. "2: 125. 1822;" ed. II. 2: 125. Pl. 99. 1833.

[18] Archiv. Pharm. 229: 256, footnote. 1891.

[19] Prodr. 1: 625. 1824.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

ENTOMOLOGY.—*Note on the European corn borer* (Pyrausta nubilalis *Hübner*) *and its nearest American allies, with description of larvae, pupae, and one new species.* CARL HEINRICH. Journ. Agric. Res. **18**: No. 3. Figs. 35, pls. 5. 1919.

This paper was written to enable positive identity in larval, pupal, and adult stages of the European corn borer, *Pyrausta nubilalis* Hübner to be made. The genus *Pyrausta* is fully characterized. All the generic, family, and larger group characters are given for the adult, larva, and pupa. Full specific descriptions and tables are also given of the larvae, pupae, and adults of *Pyrausta nubilalis* and its two nearest American allies, *P. penitalis* Grote and *P. ainsliei* Heinrich, the latter is here erected as a new species for part of the material hitherto included under the name *penitalis* Grote. The name *penitalis* is restricted to the Nelumbo feeding species; *nelumbialis* Smith remaining a synonym of *penitalis*. Male and female genital characters are used for the first time in separating and defining these species. Five plates containing thirty-five figures of the structural characters illustrate the article.

C. H.

ENTOMOLOGY.—*The ants of the British Solomon Islands.* WILLIAM M. MANN. Bull. Mus. Comp. Zool. No. 7. Pp. 273–391. Figs. 59, pls. 2.

An account of the ants of the islands based on collections made by the author in 1916. The ant fauna of the Solomons had been almost entirely neglected, less than a half dozen species being known from there, so a number of forms among the 144 listed in the present paper are new to science. A new Ponerine genus (Wheeleripone) is described and several new subgenera proposed. Practically the entire list of species belong to Indo-Malayan genera and, in the introduction, the Solomon Islands are considered zoogeographically to be the eastern limits of the Papuasian region.

A curious new exudating habit in the workers of *Rogeria stigmatica* Emery and nesting habits of several species of *Polyrhachis* are noted. In one of the latter, *P. osae* Mann, two females combine and start a colony jointly.

S. A. ROHWER.

CHEMISTRY.—*The determination of cellulose in rubber goods.* S. W. Epstein and R. L. Moore. Bur. Standards Tech. Paper **154.** Pp. 16. 1920.

After a discussion of the value of a procedure for determining cellulose in rubber goods and consideration of the literature on the subject, the proposed method is discussed.

Method.—Sample is digested with cresol at 160–185° C. for 4 hours to dissolve the rubber. Filtration is facilitated by addition of 200 cc. of petroleum ether. After washing with benzol, 10 per cent solution of hydrochloric acid, water and acetone, the material is dried and weighed. It is then acetylated by heating for 30 minutes at 75° C. in a mixture of 15 cc. of acetic anhydride and 0.5 cc. of concentrated sulphuric acid. This is filtered on a weighed Gooch, washed with 90 per cent acetic acid and then with acetone and dried and weighed. Loss in weight is recorded as cellulose. S. W. E.

ANALYTICAL CHEMISTRY.—*The analysis of silicate and carbonate rocks.* W. F. Hillebrand. U. S. Geol. Survey Bull. **700.** Pp. 285, figs. 23. 1919.

This book, which is the fourth edition of Dr. Hillebrand's treatise, sets forth the modern methods of procedure to be followed or the precautions to be observed in rock analysis. The author advocates that rock analyses should be made as complete as possible, and not stop with determinations of silica, alumina, the oxides of iron, lime, magnesia, the alkalies and water; and suggests that, whenever possible, a thorough microscopic examination of the rock in thin section should precede the chemical analysis. Useful appliances and apparatus are described and illustrated. R. W. Stone.

CHEMISTRY.—*Estimation of nitrates and nitrites in battery acid.* L. B. Sefton. Bur. Standards Tech. Paper **149.** Pp. 38. 1920.

From among the various methods suggested for the estimation of nitrates and nitrites in small amounts, and admitting of a sulphuric acid medium, three methods for the determination of nitrates—the Diphenylamine, the "Hydrostrychnique," and the Brucine—and three for the determination of nitrites—the Iodide, the Indol and the Dimethylaniline—were selected and studied with reference to their use in testing battery acid.

The Diphenylamine test for nitrates and the Iodide test for nitrites were found to be wholly unreliable. It was found impossible to estimate nitrates in the presence of nitrites; the "Hydrostrychnique" and the Brucine test reacted with nitrites in the same way as with nitrates so that the results of these methods must be expressed in terms of nitrates and nitrites. In the absence of iron, the "Hydrostrychnique" or a modification of the Brucine test is recommended. In the presence of iron, only the original Brucine test may be used.

It was found that nitrites could be estimated in the presence of nitrates and best by the Dimethylaniline method. L. B. S.

PHYSICAL CHEMISTRY.—*Hydrogen ion concentration in dry cells.* H. D. HOLLER and L. M. RITCHIE. Bur. Standards Sci. Paper **364**. Pp. 10, figs. 3. 1920.

The potentials of electrodes consisting of mixtures of Acheson graphite with three different manganese ores and a chemically prepared oxide were measured in ammonium chloride solutions of different hydrogen ion concentrations. The potential of the electrodes containing the ores was found to be a logarithmic function of the hydrogen ion concentration, while the potential of electrodes containing the chemically prepared oxide was found to be independent of hydrogen ion concentration. The potential of the ores was found to decrease in acid solution and to increase in alkaline solutions. The relation found between the potential of the manganese dioxide electrode and hydrogen ion concentration, explains variations in open-circuit voltage of dry cells containing a given ore, and also accounts for a portion, at least, of the polarization of dry cells on discharge. H. D. H.

ENGINEERING.—*The accuracy of commercial electrical measurements.* H. B. BROOKS. Advance Paper, Trans. A. I. E. E. 1920. Presented February 20, 1920.

The paper discusses the accuracy required in commercial electrical measurements, and the means of obtaining it, namely, proper choice, installation, use, and maintenance of instruments. The effect of room temperature change is discussed in detail, with special attention to features and methods of design which will minimize this effect. The effect of stray magnetic field is discussed from the same viewpoint.

Considering electrodynamic instruments as reducible to a pair of coils capable of relative motion, it is shown experimentally that the errors

introduced by accidental bending of the index will be least if $dM/d\theta$ is constant over the whole range of movement, M being the mutual inductance of the coils and θ the angle by which one is turned with respect to the other.

Features of design which affect the accuracy are briefly discussed. These include permanent magnets, springs, and ratio of the torque of the moving element to its weight.

When a direct-current voltmeter is connected to two points on a network, the reading is in general not a measure of the previous potential difference of the points because the voltmeter takes a current and thus alters conditions in the network. By taking a second reading with the voltmeter shunted by a resistance equal to its own and using a simple formula, this potential difference may be found. Similarly, when a direct-current ammeter is inserted in one branch of a network, the currents in the network are altered by the addition of the resistance of the ammeter. By taking a second reading after adding extra resistance equal to that of the ammeter, the same form of expression will give the current in the branch before inserting the ammeter.

The electrodynamic wattmeter is treated in considerable detail. An equation by Laws is developed into a general correction formula for the effect of both self and mutual inductance, from which the effect of either can be found.

The principal sources of error in electric energy meters and features which should be improved in these and other electrical measuring instruments in the near future are briefly discussed. H. B. B.

GEOLOGY.—*Bibliography of the metals of the platinum group—osmium, platinum, palladium, iridium, rhodium, ruthenium*, 1748–1917. JAS. LEWIS HOWE and H. C. HOLTZ. U. S. Geol. Survey Bull. **694**. Pp. 555.

The first edition of this bibliography, by Dr. Howe, was published in 1897 as a volume of the Smithsonian Miscellaneous Collections and gave a list of the articles on the metals of the platinum group found in scientific literature to the end of 1896. A supplement to this edition, prepared by Dr. H. C. Holtz, of Amsterdam, brought the record down to 1910 but was never published. Dr. Howe received the manuscript of this supplement and has filled its gaps and brought the record down to the end of 1917. The 450 pages of bibliographic references are followed by an author index and a subject index. R. W. STONE.

PHYSICS.—*Preparation and reflective properties of some alloys of aluminum with magnesium and with zinc.* R. G. WALTENBERG and W. W. COBLENTZ. Bur. Standards Sci. Paper **363**. Pp. 5, figs. 1. 1920.

This paper gives the manner of preparation and determination of the spectral reflective properties of alloys of aluminum with magnesium and with zinc.

The reflectivity measurements were made with a spectroradiometer consisting of a mirror spectrometer, a fluorite prism and a vacuum bismuth-silver thermopile. It was found that all of these alloys tarnish in time and hence are not suitable for mirrors where permanency is of prime importance. The compound of aluminum and magnesium, Al_3Mg_4, deteriorates less rapidly than any of the other alloys examined and could be used in apparatus where a highly reflecting mirror is desired for a short time. A reflectivity of 92 per cent at 0.7μ was obtained with this compound.

The zinc-aluminum alloy has a minimum of reflectivity at 0.9μ. An examination of pure zinc disclosed a similar reflectivity minimum at 1.0μ. R. G. W.

TECHNOLOGY.—*Cement for spark plugs.* HOMER F. STALEY. Bur. Standards Tech. Paper **155**. Pp. 10. 1920.

The use of cements for sealing electrodes into spark plug porcelains has been found to be attended by serious difficulties in high temperature engines such as airplanes. Among these are: Promotion of oxidation and destruction of the electrode wires by reactions taking place in the cement and between the cement and electrode wires; breaking of spark plug porcelains caused by difference in coefficients of thermal expansion of electrode wires and porcelain; and cracking of cement, with consequent gas leakage, due to the same cause. A cement composed of silicate of soda and raw kaolin has been found to give little trouble from chemical action. In order to avoid the difficulties attending the use of any form of cement, the use of a mechanical seal at the top of the porcelain has been tried with promising results.

H. F. S.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY OF WASHINGTON

ANNUAL MEETING, 1919

The 825th meeting and 49th annual meeting of the Society was held at the Cosmos Club, December 6, 1919. President HUMPHREYS presided, and 21 members were present. In the absence of the Recording Secretary, the Corresponding Secretary was appointed to act in his stead.

The minutes of the 48th annual meeting were read and approved.

The reports of the Secretaries were read by the Corresponding Secretary. These reports showed that the present active membership is 194, the net gain for the year being 13. Of the active members two died during the year, namely, JAMES M. FLINT and E. C. MCKELVY. 31 new members were elected and qualified, 2 were transferred to the active from the absent list, while 16 were transferred to the absent list, one resigned, and one was dropped.

During the year the Society held 13 meetings for the presentation of papers, in addition to one joint meeting with the Washington Academy of Sciences. At these 13 meetings 27 papers were presented, 4 being by non-members. The average attendance was 53.

It was moved and carried that the reports of the Secretaries be accepted.

The report of the Treasurer, Mr. E. F. MUELLER, was presented, and showed receipts of $1,145.17 from dues ($518.75) and interest ($626.42), while disbursements for current expenses were $833.70, and outstanding bills are estimated at $75. The cash on hand is $393.33, bills receivable amount to $59.25, while securities held amount to $13,000 par value.

The excess of income over expenditures for the year was $312.47.

The report of the auditing committee, W. F. MEGGERS and C. R. DUVALL, was presented by Dr. MEGGERS, and indicated that the report of the Treasurer was correct in all essential respects.

Moved and carried that the reports of the Treasurer and of the auditors be accepted.

The report of the tellers, H. F. STIMSON and R. C. DUNCAN, was presented by Dr. STIMSON. 47 nominating ballots were received.

The Society proceeded to the election of officers, which resulted as follows:

President, ROBERT B. SOSMAN; *Vice-President*, R. L. FARIS; *Corresponding Secretary*, D. L. HAZARD; *Treasurer*, JNO. A. FLEMING; *Members-at-large of General Committee*, WALTER P. WHITE, E. F. MUELLER.

Under the head of discussion of Society policies and recommendations to General Committee, there was considerable discussion involving criticism of the method now used to nominate officers. It was moved by E. F. MUELLER that the General Committee be requested to consider the matter and report its findings to the Society. Motion carried.

Rough minutes of the meeting were read and approved.

At 9.45 the Society adjourned.

E. C. CRITTENDEN, *Corresponding Secretary.*

BIOLOGICAL SOCIETY

604TH MEETING

The 604th regular meeting of the Biological Society of Washington was held in the lecture hall of the Cosmos Club, January 10, 1920. Dr. A. D. HOPKINS, President, called the meeting to order at 8.05 p.m., with 45 persons present. Mr. JACOB KOTINSKY, of the Bureau of Entomology, was elected to membership.

The President announced the appointment of the standing committees as follows: *Publication Committee,* CHAS. W. RICHMOND, J. H. RILEY, NED DEARBORN, ALEXANDER WETMORE. *Committee on Communications,* S. A. ROHWER, CHAS. E. CHAMBLISS, R. E. COKER, FRANCIS HARPER.

Under the heading of *Brief notes and exhibition of specimens,* Dr. WALTER P. TAYLOR stated that in making observations on Mt. Rainier for the Biological Survey during the summer of 1919, he received reports of mammals existing far above timber line and even upon the summit. These reports were verified between August 6 and September 26, in most cases by specimens trapped, as to the Whitefooted Mouse, *Peromyscus maniculatus oreas*; a Chipmunk, *Eutamias amoenus* subsp.; Douglas Squirrel, *Sciurus douglasii;* the Western Bushy-tailed Wood Rat, *Neotoma cinerea occidentalis*; and the Large-footed Field Mouse, *Microtus richardsoni arvicoloides.* These animals seemed to subsist chiefly upon lichens among boulders and snow. All were observed at altitudes of 10,000 feet, and some at the summit, over 14,000 feet in altitude. The altitudes attained by these mammals are not so remarkable in themselves, but the chief interest is in the fact that the trees of Mt. Rainier stop at about 6,500 feet, and that the mammals here mentioned as seen upon Rainier were observed from 3500 to nearly 8000 feet above timber line. More complete notes are given in the *Journal of Mammalogy.*

Dr. T. S. PALMER remarked that 1920 marked the 50th anniversary of the description of fossil birds from America. In 1870 Dr. O. C. MARSH described 7 species, 5 from the Cretaceous of New Jersey. Two years later the toothed birds of Kansas were discovered. It was emphasized that by far the larger number of the birds from the older deposits were described in the early part of this 50-year period. About 125 fossil birds have been discovered since, but most of them from later deposits.

Regular Program

T. E. SNYDER: *An account of the habits of Termites or White Ants.*

Injury caused by termites to buildings, etc., in the United States is often supposed to be caused by species imported from the tropics, but this is not the case. There are 39 species representing 10 genera in the United States, more than the known species of such tropical countries as Japan, Cuba and Hawaii combined, or of Japan, the Republic of Panama and Hawaii combined. Termites occur far north in North America and also at great altitudes.

While Nearctic termites are not as spectacular as the tropical species (they do not construct mounds, but nest in the earth or wood), there are many interesting species with peculiar habits among them.

Many of the habits of the social insects have been attributed to such instincts or feelings as parental feelings of man. Such "anthropomorphisms" are as a rule false. Many of the instincts of insects, such as the care of the brood, queen, etc., can be explained by purely selfish motives, e.g., eagerness for body exudates, while other instinctive behavior is due to odor of body, contact, etc.

There is considerable damage to the woodwork of improperly constructed buildings by termites in the United States; new as well as old buildings are infested. Much of the damage to the woodwork of buildings in the United States by termites (*Reticulitermes* spp.) can be prevented by completely isolating all wood in contact with the ground. When once this source of moisture is shut off, the soft-bodied termites soon disappear.

Instead of one type of "queen" mother there are several types of "queens" or reproductive forms of termites. While studies of termites have been made in many countries for hundreds of years, knowledge of the biology is far from complete.

Mr. Snyder illustrated his paper with lantern slides of several forms of termites and of their work. The paper was discussed by L. O. HOWARD and WM. PALMER.

WILLIAM PALMER: *Some birds of the Chesapeake Bay.*

An account was given concerning the occurrence and habits of some thirty species of birds, mostly water birds, that have been observed during several years along some twenty miles of the Calvert Cliffs of the Western Shore of Maryland. One species, the Shearwater, seen in summer, was a straggler from the ocean; while another, a land species, chuck-will's-widow, was mentioned as a regular summer resident, the northern range of the species being greatly extended. Mention was also made of the regularity of the coloring of the toad, *Bufo fowleri*, occurring along that part of the Coastal Plain, as contrasted with the great diversity of the same species about Washington, D. C. It was also mentioned that some unknown cause had brought about the death of numerous cats in the farmhouses of northern Calvert County;

in one instance eight had died in one house during one week of December, 1919. The principal bird facts of the paper will be published in the *Auk*.

605TH MEETING

The 605th regular meeting was held in the lecture hall of the Cosmos Club on January 24, 1920. President HOPKINS was in the chair and 85 persons were present. On recommendation of the Council the following were elected to membership: J. S. GUTSELL, Bureau of Fisheries; R. W. WILLIAMS, Department of Agriculture; A. H. HARDISTY, Biological Survey.

Under the heading of *Informal communications*, Dr. BARTON W. EVERMANN, former president of the Society and Director of the Museum of the California Academy of Sciences, stated that an aquarium, which had been greatly needed, had been provided for at the Museum, by a gift of $250,000. Several habitat groups had been installed in the Museum, such as that of the Roosevelt Elk and the White Pelican. The White Pelican had an extensive breeding establishment upon Arabo Island, Pyramid Lake, Nevada. Their number is about 10,000. The assumption that these pelicans ate many valuable fish caused considerable destruction of them, but the situation was saved by showing that their food was chiefly suckers and chubs. Dr. Evermann showed a reel of moving pictures illustrating the breeding grounds and the environment of the pelican in Pyramid Lake, the young, their feeding, and the adult. There were also included in the films pictures of California Gulls, Duck Hawks, and Cormorants, which are found at this lake.

Later in the evening Mr. BAILEY discussed the paper and Mr. ERNEST THOMPSON SETON made the observation that in Yellowstone Park a campaign was waged against the pelicans there on the ground that they ate valuable fish. It developed that the pelicans ate only diseased fish, a fact which led to their protection.

Regular Program

ERNEST THOMPSON SETON: *The habitat and home life of the Kangaroo Rats of our Western Desert (illustrated).*

Mr. Seton's studies were made in the Mojave Desert, typical of the western deserts; a level stretch dotted with sage bush with an occasional outstanding yucca and a rim of blue mountains tipped here and there with a store of snow. Although it is the dryest region in the United States, there is an astonishing amount of animal life, not always, however, in evidence. It is at night that from every bush its animal tenant emerges, leaving its trail or other record. Some 30 species were mentioned. Attention was given to the Kangaroo Rat, a large species, rather scattered and rare, yet should the census of the area 100 feet square which was intensively studied, hold for the area over which the Kangaroo Rat lives, there would be 750,000,000 of them.

One burrow was carefully studied; its galleries totaled 75 feet, mostly on a level of about two feet below the surface. Store rooms with but little in them (May 15), a nursery and a relatively large empty room, were found, also compartments for gathering feces, one especially for the young, near the nursery. There were 9 or 10 openings, 2 or 3 of which were vertical shafts used apparently only for ventilation.

The nocturnal habits of the Kangaroo Rat are necessarily hard to follow. They jump 8 to 10 feet regularly, perhaps 15 feet in an emergency. They travel considerable distances, a mile, perhaps, for food such as alfalfa when it is available. They have great ability to find their way home and through their galleries, and a corresponding development of the semicircular canals of the ear as in the homing pigeon and other animals with greatly developed sense of direction. Between the shoulders of both sexes is a gland of considerable size. The supposition that this gland is rubbed on branches or elsewhere for purposes of communication or identification in a manner comparable to that of some ungulates could not be confirmed. They communicate very little by squeaks or other recognizable means. The Kangaroo Rats dig in the open places among the bushes. Search in such places revealed a few insects, mostly beetles. Perhaps this is the only source of fluid, other than that released by oxidation of carbohydrates, for a large part of the year. There is evidence that these animals have games at their gatherings in open places among bushes. In the burrows are some symbionts, mostly beetles, but no rattlesnakes or other large animals.

Mr. Seton's paper was discussed by VERNON BAILEY, E. W. NELSON, H. H. T. JACKSON, L. O. HOWARD, and the Chairman.

The Chairman of the Committee on Communications, S. A. ROHWER, announced that the suggestions which had been laid before the Society relating to the meetings had been taken under consideration, and that the subject of submitting questions for answers was especially discussed with a view of puting the suggestion into effect.

606TH MEETING

The 606th meeting of the Biological Society of Washington was held in the lecture hall of the Cosmos Club at 8 p.m. February 7, 1920, with Dr. A. D. HOPKINS in the chair, and 45 persons present.

Under the heading of *Brief notes*, Dr. W. P. TAYLOR made inquiry regarding the flocking habits of certain species of small birds in the woods of the northwest coast, such as the Western Golden-crowned Kinglet, Chestnut-backed Chickadee, Shufeldt Junco, Red-breasted Nuthatch, and Townsend and Lutescent Warblers. Reasons suggested for these interspecific associations, such as sociability, protection from enemies, and more efficient food getting, may partially account for the flocking but are not fully satisfactory.

Dr. T. S. PALMER commented upon the feeding of quail during the inclement weather then prevailing. He stated that the Metropolitan Police, the Audubon Society, and individuals were actively cooperating in the work in a number of widely scattered places. Advantage is taken of the opportunity to count the number of covies and individuals. In 1918 about 1200 quail were reported; this year, incomplete returns show an increase in several precincts.

Dr. HUGH M. SMITH stated that the Alaskan fur seal herd is rapidly increasing under international protection forbidding sealing at sea, and restricting killing upon land. The recent sale of one-fourth of the catch of 1918, consisting of 9,100 skins, yielded $1,282,000.

Dr. R. E. COKER stated that a valuable mussel pearl fishery exists in certain rivers of the United States, especially in the Mississippi River system. The value of the fisheries is several hundred thousand dollars, one-half of which is in the shells. Photographs of peculiar and interesting forms of pearls from mussels were exhibited, and also photographs showing several stages in the metamorphosis of the Acorn Barnacle.

Dr. PAUL BARTSCH remarked that the feeding of quail calls attention to the value of water. In the city limits birds generally have great difficulty in finding water. Many more birds will visit drinking fountains than feeding troughs.

Regular Program

C. DWIGHT MARSH: *Some poisonous plants and their effects.* (Illustrated.)

The number of plants which are poisonous, in the usual sense of the word, is greater than commonly supposed. One published list gives 25,000 poisonous species. The Department of Agriculture is gathering data in regard to the effect of such plants on animals. The studies are chiefly in the West, where grazing animals have access to poisonous plants in great numbers, and the losses reach great economic importance. As a means of determining some of the causes and effects of poisonous plants upon stock, there have been established field stations at suitable places where chemist and pharmacologist may have immediate access to fresh cases, and may conduct experiments. It is not probable that animals instinctively avoid poisonous plants, but that they reject them on account of distasteful properties which the plants usually possess. Animals will, however, eat them when pressed by hunger, and sometimes develop a passion for certain of them. The data gathered are definite, but are only preliminary to the real problem, which is to prevent losses from such poisonous plants.

Dr. MARSH exhibited lantern slides showing field stations near Denver and in the Wasatch Mountains, the facilities for handling poisoned animals, and the poisoned animals themselves as affected in characteristic manner by different plants. A long series of poisonous plants, many of them in their habitat, both eastern and western species, were shown with comments.

PAUL BARTSCH: *Our poison gas detector and how it was discovered.* (Illustrated).

Dr. Bartsch first described the nocturnal mating habits of *Limax maximus*, a common garden slug, illustrating the successive acts with photographs taken by flash-light. The slugs, which are bi-sexual, climb trees at night; a pair will twist themselves together, spin a mucous thread, and hang suspended. The genitalia are protruded, and after exchange of products, accompanied by characteristic activities, the pair ascend the thread and retire to their usual retreats where the eggs are deposited.

Some years ago, Dr. Bartsch continued, a number of animals of this species which were under observation in his home, escaped from their box in which they had been confined. Observations on their behavior in the furnace room were recalled when need for a gas detector arose in connection with the great war. A very brief period of experimentation revealed the extraordinary sensitiveness of *Limax maximus* to mustard gas, and in an incredibly short time the information, invaluable for detecting the gas, was in the hands of the Allies and American forces in Europe. The tentacles of *Limax* are sensitive to a dilution of 1 to 10,000,000 of mustard gas, and characteristic responses indicate the degree of dilution. Since man reacts at a dilution of 1 to 4,000,000, *Limax* proves to have ample margin of delicacy. Moreover the species is European, and abundant in the region of the fighting.

Dr. Bartsch pointed out how incidental, even accidental, observations years ago furnished immediate answer to the problem calling for reliable sensitive detectors of certain gases during the war.

The paper was discussed by Dr. H. M. SMITH.

607TH MEETING

The 607th meeting of the Biological Society of Washington was held jointly with the Washington Academy of Sciences in the lecture hall of the Cosmos Club at 8.15 p.m., February 21, 1920. President HOPKINS presided, and 75 persons were present.

Upon recommendation of the Council, Miss DORIS LANGWORTHY, of George Washington University; Mr. K. P. SCHMIDT, of the American Museum of Natural History, and Miss MARION PELLEW, were elected to membership.

The address of the evening was given by Dr. ALFRED G. MAYOR, Director of the Division of Marine Biology, Carnegie Institution of Washington, and Lecturer in Zoology at Princeton University, upon the subject: *The coral reefs of American Samoa.*

The Island of Tutuila in its relation to its marine environment was described, and the distribution of the various reef-forming algae and corals. The island is very old as is shown by geological evidence. The reefs were described, including rate of coral growth, and the conditions prevailing, and the various theories of reef formation were discussed in the light of the observations made at Tutuila. Though none of these

theories is wholly satisfactory, it was possible to review the history of the island in its essential features. The lecture was illustrated with numerous maps, diagrams, and photographs of reefs and corals and the more general landscape features. These were supplemented with pictures of natives and their homes.

The paper will appear in the *Proceedings of the American Philosophical Society*. It was discussed by Dr. T. WAYLAND VAUGHAN.

A. A. DOOLITTLE, *Recording Secretary*.

SCIENTIFIC NOTES AND NEWS.

Lectures before the Physics Club of the Bureau of Standards have been delivered as follows since the preceding report in the *Journal:*[1] February 2 and 16, L. J. BRIGGS: *The resistance of the air;* February 9, J. S. AMES: *Einstein's gravitation;* March 1, W. J. HUMPHREYS: *The physics of thunderstorms;* March 15, R. W. WOOD: *Spectroscopic phenomena in very long vacuum tubes;* March 27, SAUL DUSHMAN: *The ionization gage;* March 22 and 29, and April 5, M. D. HERSEY: *Irreversibility in physics, with special reference to elastic lag;* April 12, M. D. HERSEY, J. R. FREEMAN, and others: *Symposium on irreversibility in physics;* April 19, and May 3 and 10, EDGAR BUCKINGHAM: *Elements of theory of dimensions.*

Messrs. W. L. ABBOTT and E. C. LEONARD report from Haiti that a successful collecting trip to Gonave Island has been completed. Rainfall on that island has been very deficient for three years, and the original forest has practically disappeared and been replaced by grass lands.

Dr. JOHN ALFRED BRASHEAR, astronomer and manufacturer of astronomical instruments, and a non-resident member of the ACADEMY, died at his home in Pittsburgh, Pennsylvania, on April 8, 1920, in his eightieth year. Dr. Brashear was born at Brownsville, Pennsylvania, November 24, 1840. He began life as a blacksmith in a Pittsburgh mill, but his interest in research soon led him into the manufacture of astronomical and physical instruments, a vocation which he combined with astronomical research, particularly upon the sun and moon. His work had been recognized by his election to honorary membership in a number of American and foreign astronomical societies. His interest in recent years had been mainly with the advancement of educational facilities. He became a member of the ACADEMY in 1915, and was elected a non-resident vice-president in 1919.

Dr. AUSTIN H. CLARK, assistant curator in the Division of Marine Invertebrates of the National Museum, has been appointed curator of the Division of Echinoderms.

Mr. E. H. FINCH, geologist of the Land Classification Board of the U. S. Geological Survey, resigned at the end of March to accept a position with the California division of the Dutch Shell oil corporation and has left Washington for California.

Mr. GERARD FOWKE, a collaborator of the Bureau of American Ethnology, left St. Louis on April 1 for Honolulu. He will make an archeological reconnaissance of the Hawaiian Islands with a view to future intensive work by the Bureau.

[1] This JOURNAL 10 : 115. February 19, 1920.

Mr. D. F. HEWETT of the U. S. Geological Survey will make a special examination of certain manganese claims in Cuba for the War Minerals Relief Commission, beginning about April 15.

Mr. FRANK LEVERETT of the U. S. Geological Survey, stationed at Ann Arbor, Michigan, is engaged in an investigation of road materials for the Michigan State Highway Commission.

Dr. W. M. MANN of the Division of Insects, U. S. National Museum, has returned from a two months' trip through Spanish Honduras, where he visited the principal fruit growing districts and made collections of economic insects, especially those attacking fruits.

Messrs. WILLIAM R. MAXON and ELLSWORTH P. KILLIP of the National Museum returned to Washington on April 16, after spending two months in botanical exploration in Jamaica.

Messrs. O. E. MEINZER and J. C. HOYT of the U. S. Geological Survey returned to Washington from Hawaii in the latter part of April.

Mr. H. D. MISER of the U. S. Geological Survey went to Fayetteville, Arkansas, on May 1, to fill, until the end of the college term, the position left vacant by Professor DRAKE in the Department of Mining and Geology of the University of Arkansas.

Mr. W. E. MYER of Nashville, Tennessee, has been at work in the library of the Bureau of American Ethnology, putting into form many years' field notes on the mounds and artifacts of Tennessee.

Mr. CYRIL S. TAYLOR resigned from the Bureau of Standards in April to accept a position in the research bureau of the Aluminum Company of America at New Kensington, Pennsylvania. He expects to begin work in the new position in June.

Mr. F. G. TRYON has been appointed Mineral Geographer on the U. S. Geological Survey, and has been assigned to the Fuel section of the Mineral Resources division.

Mr. D. E. WINCHESTER has returned temporarily to the U. S. Geological Survey to finish his manuscript on "Oil shales of the Rocky Mountain region."